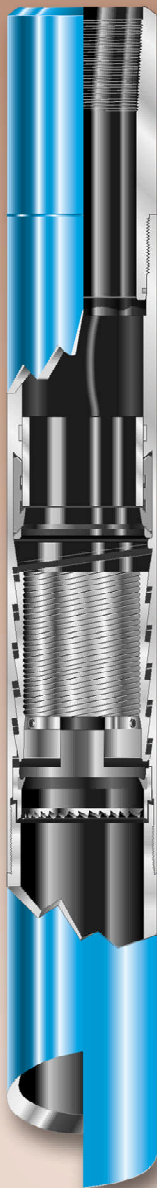


PACKER TYPE CASING PATCHES

Instruction Manual 6300



Packer Type Casing Patches

One Company Unlimited Solutions

NOV NATIONAL OILWELL VARCO

Packer Type Casing Patches

INDEX

Packer Type Casing Patches

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The designs and specifications for the tools described in this instruction manual were in effect at the time this manual was approved for printing. National Oilwell Varco, whose policy is one of continuous improvement, reserves the right to discontinue models at any time, or to change designs and specifications without notice or without incurring obligation.

Seventeenth Printing, September 2005

General Description

The **Bowen Packer Type Casing Patch** is an external catch tool, designed to engage a previously prepared fish, pack it off, and become a permanent part of the repaired casing, pipe or tubing.

The same dependable method of engagement and release which is utilized for Bowen Overshots is employed in the Bowen Packer Type Casing Patch. This method assures positive engagement and positive seal-off from either direction. The Patch provides a permanent connection which remains rigid and leak-proof for many years, yet is positively releasable if ever the need arises.

Bowen Packer Type Casing Patches will not restrict the bore of the casing or tubing in any manner.

The Bowen Packer Type Casing Patch is composed of three outside parts and five internal parts. This simplicity of design is matched by the simple positive operation.

Use

The Bowen Packer Type Casing Patch as indicated, is used to repair a damaged casing string by replacement of the damaged section, without having to remove the entire string of casing from the hole.

Where the upper portion of a casing string becomes ruptured or disoriented from the lower portion such as by faulting or caving of the formation, crushing, rupture, or backing off, the upper portion must be removed. New casing is then replaced, the Bowen Packer Type Casing Patch forming the patching means between the old and new strings.

Construction

The Bowen Packer Type Casing Patch is constructed in the most basic manner to perform the functions of engaging the fish, sealing off the fish, or releasing, either during or after setting operations, should this become advisable.

The TOP SUB, BOWL and GUIDE from the outer assembly.

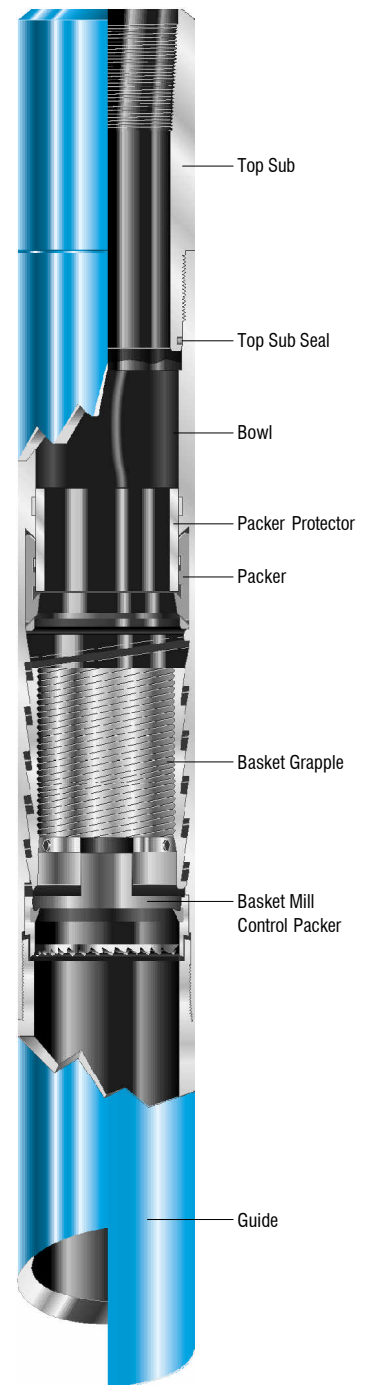
The TOP SUB has an upper connection to match the running string, and a lower connection to mate with the Bowl. A Top Sub Seal is located immediately below the lower thread of the Top Sub.

The BOWL has an upper connection for the Top Sub, an area of length into which the PACKER PROTECTOR slides during operation, a spiraled section which contains the engaging GRAPPLE, a space for the MILL CONTROL PACKER, and a lower connection to accept the GUIDE.

The GUIDE is usually flush with the outside diameter of the Casing Patch, and cut lipped. The primary purpose of the Guide is to assist smooth entry of the fish into the catch area of the patch. A secondary function is to maintain the inner working parts in position.

The inner working parts of the Bowen Packer Type Casing Patch are the GRAPPLE, PACKER, MILL CONTROL PACKER AND PACKER PROTECTOR.

The GRAPPLE is essentially a cylinder with wickers in its inside diameter for engaging the fish, and spirals on its outside diameter to mate with the spirals in the Bowl. Both the wickers and the spirals are made with a left-hand lead, which allow release by right-hand rotation. The Grapple has a series of longitudinal slots which allow the Grapple to flex diametrically during operation.



Bowen Packer Type Casing Patch

The PACKER is a double lipped sleeve type packer, molded in one piece from synthetic rubber compound. The material is chosen to include the best combination of properties for general oil well service. It withstands most well fluids; has good resistance to gas invasion, and abrasion.

In service, the outside of the Packer seals against the inside of the Bowl. The upper lip is protected from damage by the Packer Protector, until the entering fish pushes the Packer Protector up out of the way.

The MILL CONTROL PACKER serves the dual purpose of milling off burrs from the outside of the fish as it enters the assembly and serving as a special key to key the Grapple to the Bowl. The Grapple is free to move up and down sufficiently to engage or release the fish, but is prevented by the Control Finger from rotating. Thus, the torque required to release the assembly may be transmitted from the running string through the Top Sub, Bowl, Control Packer and on to the Grapple.

Operation

Prior to running the Casing Patch, the fish should be prepared. This usually includes washing over and cleaning the upper end of the fish of splits and burrs, and "sizing" the fish.

The tool should be assembled in accordance with the "Complete Assembly" instructions found on this page.

Assemble the tool to the running string and buck it up tight.

CAUTION: Use tongs on Top Sub only. If undue pressure is exerted on the Bowl, crushing or distortion may result.

Lower the tool into the hole until the fish depth is reached. As the fish is reached the running string should be slowly

rotated to the right while lowering it slowly. This combined slow rotation and lowering is important to the operation of the tool.

This should be continued until the fish has entered the tool and "bottomed" the Packer Protector against the lower end of the Top Sub. This can be determined by watching the rig weight indicator. Allow 15,000 to 20,000 pounds of weight to be supported by the Casing Patch, to assure good and complete engagement.

At this point, pick up the running string to remove the weight from the Casing Patch, while allowing the torque to slack from the running string.

CAUTION: Avoid any backlash.

The effectiveness of the Packer may be checked at this point, by application of mud pressure.

CAUTION: Care should be exercised during application of pressure to increase the Pressure gradually, allowing the Packer to seat smoothly. In no case should the Casing Patch be "slugged" or shock loaded unnecessarily by the mud pumps.

Pick up the running string and apply sufficient pull to remove any slack from the string, and set the slips. No load is required to maintain engagement nor is any load required to effect or maintain a seal; any excessive pull should therefore be avoided, as excessive pull reduces the allowable hydrostatic pressure capacity of the assembly. See strength charts beginning page 7.

Once the fish enters the Casing Patch and dislodges the Packer Protector, and the tool is subsequently disengaged from the fish, no attempt should be made to re-engage the tool without first bringing it to the surface to reset the Packer Protector. If the Packer Protector is not in position, there is danger of rupturing the upper lip of the Packer, rendering it useless.

NOTE: The BOWEN PACKER TYPE CASING PATCH is relatively unaffected by ordinary corrosion, etc., so that it may be released years after initial setting. If the Casing Patch is cemented in place, however, so that the internal working parts are invaded by cement; the patch may not release. In such cases, its removal may require milling it away or cutting the string below the patch and removing the patch with a portion of the milled over and retrieved string.

If for any reason it is desired to release and remove the Casing Patch from the tubing or casing string, proceed as follows:

To Release the Bowen Packer Type Casing Patch

Bump down firmly, until the top of the fish "bottoms" against the Top Sub. This will break the "freeze" between the Grapple and the fish. After bumping down, slowly elevate the running string, while simultaneously rotating slowly to the right. Continue this slow elevation and rotation until the Casing Patch is clear of the fish. This combined slow rotation and elevation is important to the proper function of the Casing Patch.

Complete Assembly

Before actual assembly begins, the parts should be thoroughly checked to assure that they are in good condition and of the proper size for the operation. The Packer, Grapple, and Mill Control Packer are all stenciled with the part number and catch size.

Clean all parts thoroughly, and lubricate them with grease or lubricating oil. If the tool is to be stored for any length of time, it is preferable to not grease the Packer or that portion of the body which houses the Packer. Petroleum products are detrimental to rubber products, particularly when stored in the open atmosphere.

Actual assembly should proceed as follows:

1. Clamp the BOWL in a suitable vise, horizontally.
2. Collapse the PACKER by squeezing one side in toward the center. This will make the Packer small enough to be passed through the top end of the Bowl and be inserted into the space provided, immediately above the spiralled section. Note that both ends of the Packer are identical, so that either end may be assembled on top.
3. Assemble the PACKER PROTECTOR in position in the Packer. This part should be slid into the top end of the Bowl and into the upper portion of the Packer, so that it comes to rest with its lower end immediately above the lower lip of the Packer. It is designed to keep the upper seal lip of the Packer deflected until the fish pushes the Packer Protector out of the Packer. This prevents the upper lip of the Packer from being damaged during the setting operation. Once the fish is in proper catch position, the Packer will seal the fish in place.

CAUTION: Once the fish enters the Casing Patch and unseats the Packer Protector the Casing Patch may be released as previously described. No attempt should be made to re-engage the fish however, once it is disengaged; a second engagement would very likely rupture the upper lip of the seal, rendering it useless. If a second engagement is necessary, the tool must be brought to the surface and the Seal Protector resealed as described in "Complete Assembly." A second run may then be made with safety.

4. Assemble the GRAPPLE in the Bowl. This may be done by grasping the Grapple by its lower end, and screwing it into the Bowl from the Bowl lower end. Left-hand rotation is required, as the spiralled outside diameter is a left-

hand lead spiral. This design allows the tool to be released by right-hand rotation, when required. The lower end of the Grapple can be distinguished from the upper end by the single large slot in the lower end of the Grapple.

Insert the Grapple deep enough into the Bowl to allow the single large slot to line up with the similar slot in the bottom portion of the Bowl spiral. The bottom of the Grapple should be just above the lowest part of the spiral in the Bowl, when in proper position.

5. Insert the MILL CONTROL PACKER into the Bowl so that the protruding control finger rests in the slot in the lower end of the bowl spiral and simultaneously in the grapple slot.
6. Apply thread dope to the threads of the GUIDE and assemble the Guide to the Bowl, and tighten.
7. Assemble the TOP SUB SEAL in the groove provided in the lower end of the Top Sub.
8. Apply thread dope to the threads (and seal) on the TOP SUB, and assemble the Top Sub in the Bowl, and tighten.

The assembly is now complete and ready for service.

Complete Disassembly

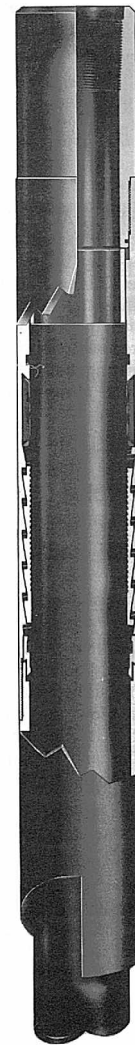
To completely disassemble the Casing Patch, proceed as follows:

1. Clamp the assembly in a suitable vise horizontally. Clamp immediately below the top connection, just below the threaded joint.
2. Break loose and remove the Top Sub.
3. Remove the Top Sub Seal.
4. Break loose and remove the Guide.
5. Lift out the Mill Control Packer.
6. Remove the Grapple. This may be

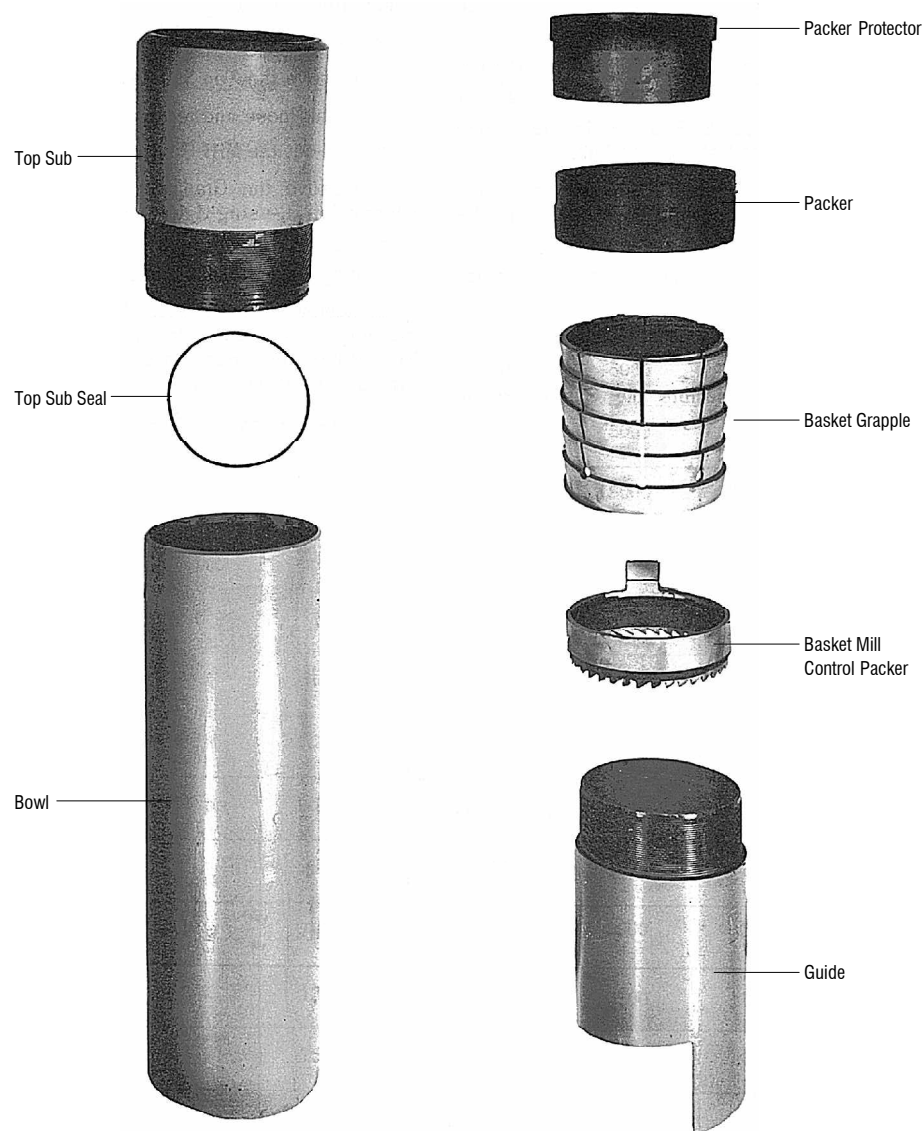
done by unscrewing it, using right-hand rotation.

7. Remove the Packer Protector by sliding it out the upper end of the Bowl.
8. Remove the Packer. This may be done by slipping a bent screwdriver under one end of the Packer until the edge can be grasped. Collapse the Packer toward the center and remove it.

This completes the disassembly of the tool.



**Bowen Packer Type Casing Patch
Shown in Set Position**



Exploded View
Bowen Packer Type Casing Patch

Calculated Tensile and Burst Strengths - Bowen Packer Type Casing Patches

See graphs on pages 9 - 12 for combined loading

Assembly No.	Casing O.D.	Patch O.D.	Maximum Internal Burst (Fluid) Press - P.S.I. *	Maximum Recommended Pressure Across Packers *	Tensile Strength At Yield with 0 P.S.I. *	Maximum Recommended Pull Load In LBS. with 0 P.S.I. *
11215	4-1/2"	5-3/4"	10,600 PSI	5000	398,600#	299,000
11220	5"	6-1/4"	9,800 PSI	5000	436,700#	327,500
11225	5-1/2"	6-13/16"	10,300 PSI	5000	481,900#	361,400
11230	6"	7-7/16"	9,067 PSI	5000	451,300#	338,500
11235	6-5/8"	7-15/16"	7,558 PSI	5000	378,600#	284,000
11240	7"	8-3/8"	8,052 PSI	5000	415,300#	311,500
11245	7-5/8"	9"	7,493 PSI	5000	414,900#	311,200
11250	8-5/8"	10-1/16"	7,450 PSI	5000	525,800#	394,400
11255	9-5/8"	11-1/8"	7,399 PSI	5000	568,400#	426,300
11260	10-3/4"	12-5/16"	7,309 PSI	5000	624,200#	468,100
17025	1" Pipe	1-29/32"	7,870 PSI	4000	27,700#	20,800
17033	3/4" Pipe	1-29/32"	7,870 PSI	4000	27,700#	20,800
22420	4"	5-1/4"	11,700 PSI	5000	362,600#	272,000
22430	5-3/4"	7-1/16"	8,496 PSI	5000	378,700#	284,000
39136	11-3/4"	13-3/8"	7,290 PSI	3500	667,200#	500,400
41042	13-3/8"	15-1/8"	6,200 PSI	3500	686,700#	515,000
80669	13-5/8"	16"	10,500 PSI	3000	1,700,000#	1,276,000
149790	20"	24"	7,500 PSI	4500	2,333,000#	1,750,000

* See the charts on pages 9 - 12 for the combined loading of burst pressure and tensile.

Note: The above burst figures apply to the bowl only. In no case should more than maximum packer pressure be applied to the Casing Patch.

Bowen Casing Patches - Packer Type - Basket Grapple

Casing O.D.		3/4 Pipe	1" Pipe	4	4-1/2	5	5-1/2	5-3/4	6
Patch O.D.		1-29/32	1-29/32	5-1/4	5-3/4	6-1/4	6-13/16	7-1/16	7-5/16
Complete	Part No.	17033	17025	22420	11215	11220	11225	22430	11230
Assembly	Weight	22	22	100	116	134	145	150	158

Replacement Parts

Top Sub	Part No.	17034	17026	22421	5186	4866	4886	22431	4966
	Weight	10	10	30	35	37	40	42	45
Top Sub Seal	Part No.	30-2	30-2	30-21	30-25	30-29	30-33	30-35	30-37
	Weight	—	—	—	1/16	1/16	1/16	—	1/16
Bowl	Part No.	9342	9342	22422	11217	11222	11227	22432	11232
	Weight	6	6	35	40	50	54	58	60
Packer Protector	Part No.	17036	17028	22423	5188	4868	4888	22433	4968
	Weight	1/8	1/8	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2
Packer	Part No.	17029	17029	22424	11216	11221	11226	22434	11231
	Weight	1/8	1/8	1/2	1/2	3/4	1	1	1
Grapple	Part No.	9343	9343	22426	11218	11233	11228	22436	11233
	Weight	1/2	1/2	6	7	7-1/2	8-1/2	9	9
Mill Control Packer	Part No.	*17030	*17030	22425	11459	11461	11463	22435	11465
	Weight	1/8	1/8	2	2-1/2	2-1/2	2-1/2	3-1/2	3-1/2
Guide	Part No.	9345	9345	22428	11219	11224	11229	22438	11234
	Weight	5	5	25	28	33	35	35	35
Packer Body	Part No.	17035	17027	—	—	—	—	—	—
	Weight	1/4	1/4	—	—	—	—	—	—

Bowen Casing Patches - Packer Type - Basket Grapple - [Continued]

Casing O.D.		6-5/8	7	7-5/8	8-5/8	9-5/8	10-3/4	11-3/4	13-3/8	13-5/8	20
Patch O.D.		7-15/16	8-3/8	9	10-1/16	11-1/8	12-5/16	13-3/8	15-1/8	16	24
Complete	Part No.	11235	11240	11245	11250	11255	11260	39136	41042	80669	149790
Assembly	Weight	171	187	203	242	296	369	450	600	820	

Replacement Parts - [Continued]

Top Sub	Part No.	4986	5026	5046	5151	5206	5162	39137	40399	80670	149796
	Weight	50	55	62	69	80	105	135	200	275	
Top Sub Seal	Part No.	30-39	30-40	30-43	30-47	30-51	30-52	568-278	27-83	27-84	568-470
	Weight	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	
Bowl	Part No.	11237	11242	11247	11252	11257	11262	39138	41044	80672	149791
	Weight	67	75	80	94	118	140	170	200	215	
Packer Protector	Part No.	4988	5028	5048	5153	5208	5164	39139	41045	80673	149794
	Weight	4	4-1/2	5-1/2	7	8-1/2	10-1/2	13	15	90	
Packer	Part No.	11236	11241	11246	11251	11256	11261	39140	41061	80674	148884
	Weight	1	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	
Grapple	Part No.	11238	11243	11248	11253	11258	11263	39142	41037	80676	149792
	Weight	9	10	11	13	15	17	19	24	30	
Mill Control Packer	Part No.	11467	11469	11471	11473	11475	11477	39141	41039	80675	149793
	Weight	3-1/2	4	4	4-1/2	4-1/2	5	6	10	12	
Guide	Part No.	11239	11244	11249	11254	11259	11264	39144	41040	80678	149795
	Weight	36	37	39	53	78	90	105	120	195	
Parbak	Part No.	—	—	—	—	—	—	—	—	—	8-470
	Weight	—	—	—	—	—	—	—	—	—	

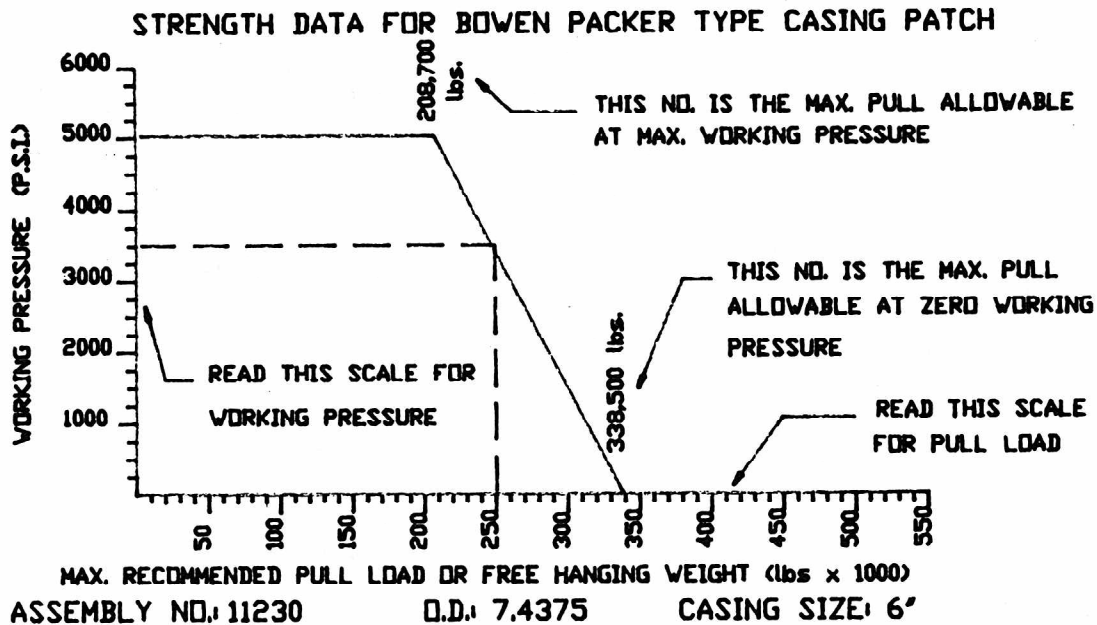
* Mill Control Without Packer.

If Sub, Bowl, Guide or Packer Body is left oversize, add 10% for each 1/4" or portion to standard price of Sub, Bowl, Guide or Packer Body.

How to Order:

Specify: (1) Name and Number of Assembly or Part.
(2) Casing O.D.
(3) Size and Type of Top Connection.

How to Use the Bowen Strength Data Chart



For example only: For 6" diameter casing with 3,500 psi, the maximum pull load is approximately 250,000 lbs.

All data assumes full engagement of a round smooth fish and a straight steady pull. Most pressure ratings in these charts are arbitrarily chosen as 5,000 psi. Higher ratings are available with special seals and larger patch diameters.

The following information is intended to be used for reference purposes only. The minimum and maximum figures published herein are accurate within $\pm 20\%$ and are based upon what are considered to be optimum operating conditions, i.e. good condition casing in a non-deviated hole, first-time engagement of the casing patch, etc.

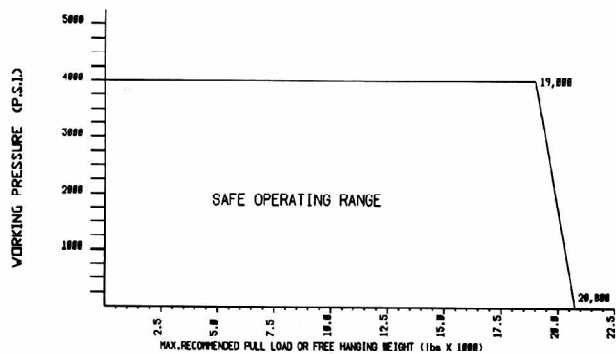
National Oilwell reserves the right to change or alter any of the information contained herein without prior notification.

Some of the following data may conflict with previously published strength data pertaining to this product. This is largely due to improved product knowledge and advancements in methods of calculating these strengths.

National Oilwell, November 1992

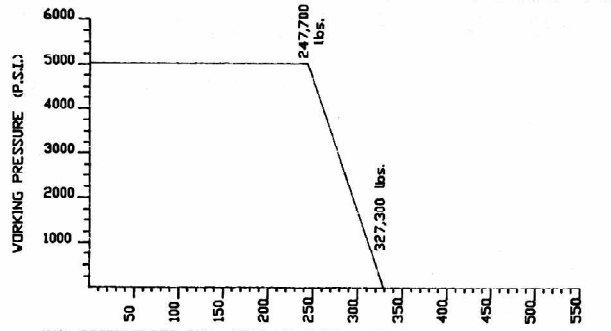
Strength Data

STRENGTH DATA FOR BOWEN PACKER TYPE CASING PATCH



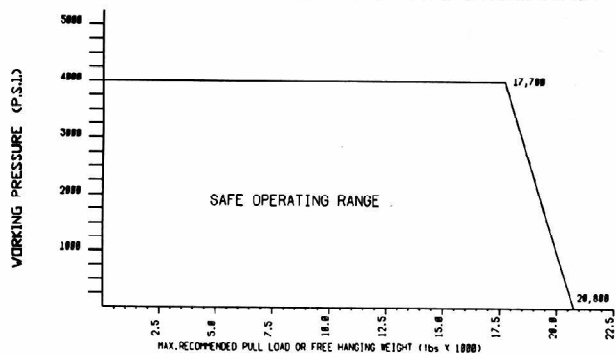
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STRENGTH DATA FOR BOWEN PACKER TYPE CASING PATCH



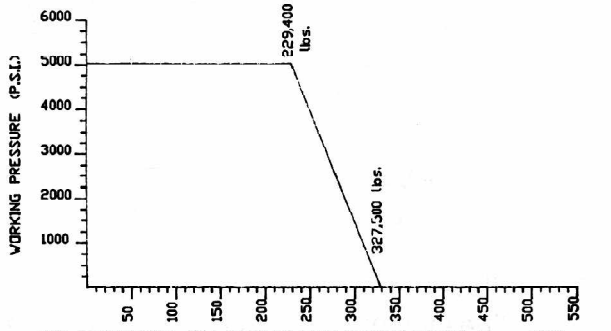
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STRENGTH DATA FOR BOWEN PACKER TYPE CASING PATCH



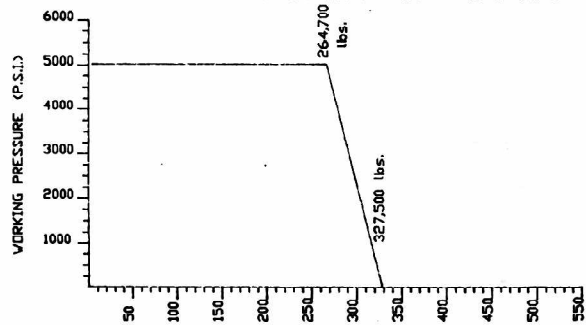
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STRENGTH DATA FOR BOWEN PACKER TYPE CASING PATCH



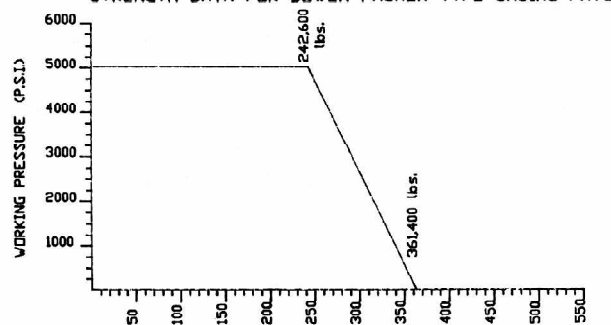
ASSEMBLY NO: 11220 O.D.: 6.25 CASING SIZE: 5"

STRENGTH DATA FOR BOWEN PACKER TYPE CASING PATCH



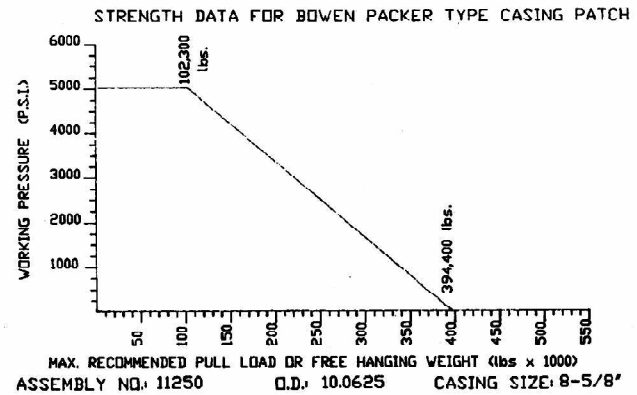
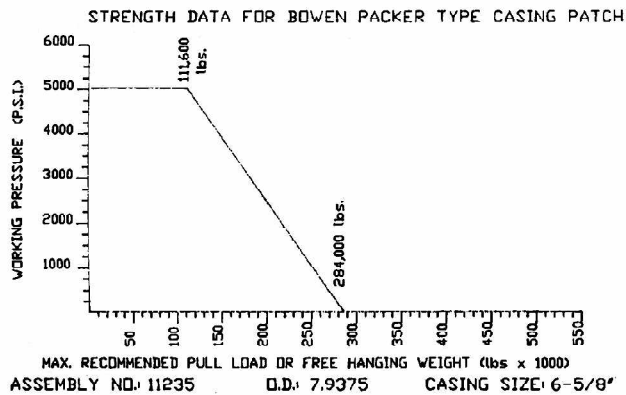
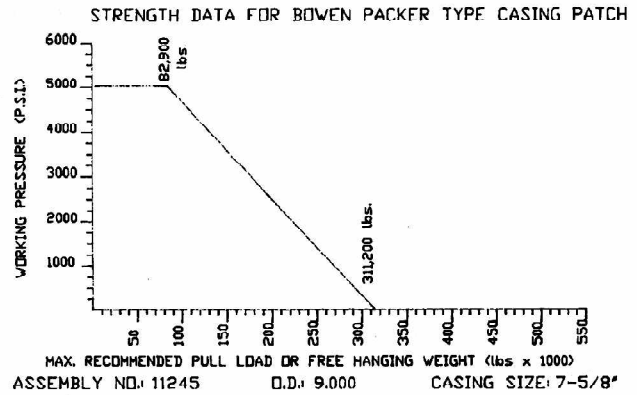
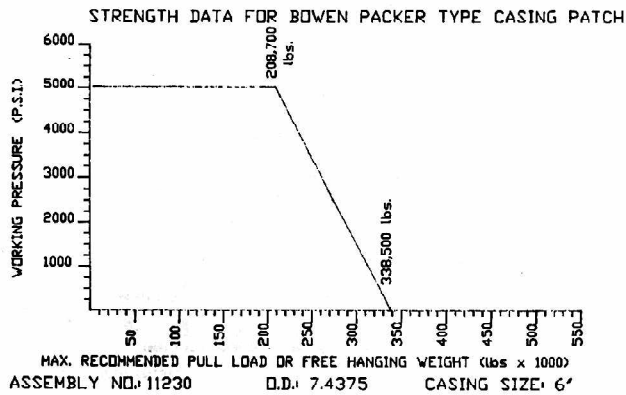
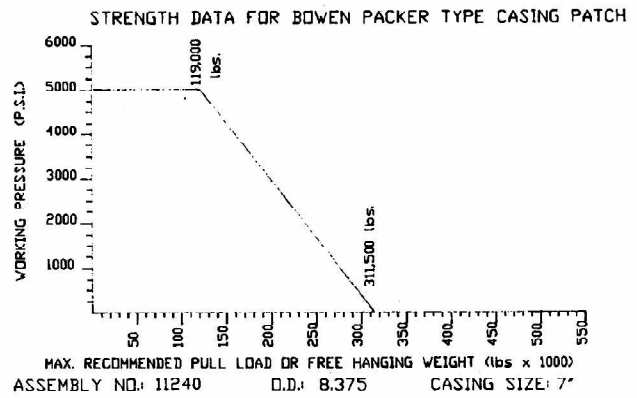
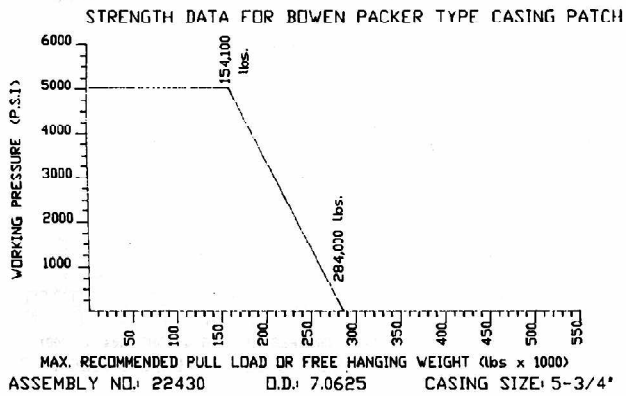
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STRENGTH DATA FOR BOWEN PACKER TYPE CASING PATCH

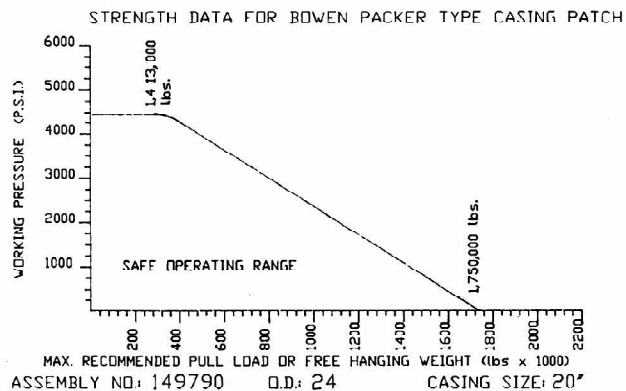
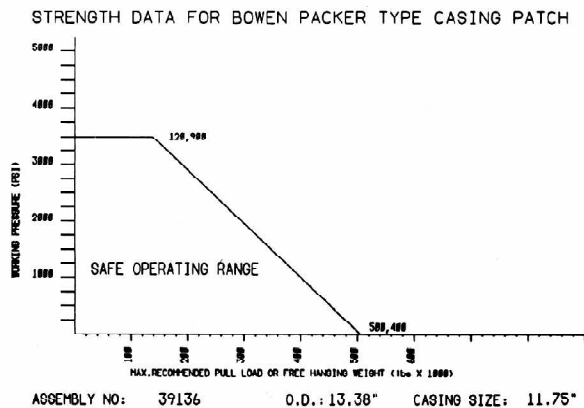
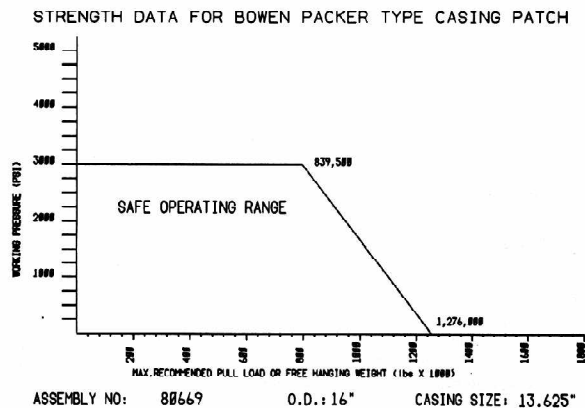
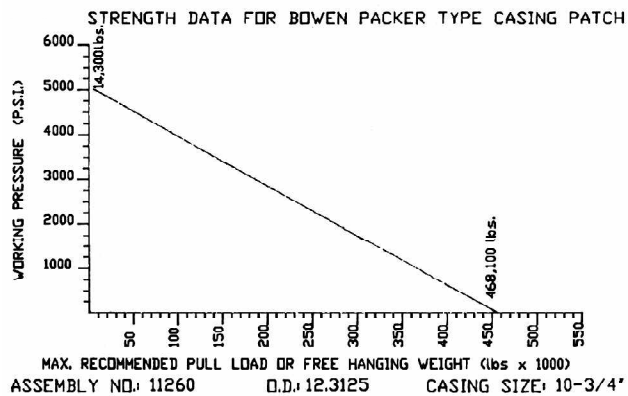
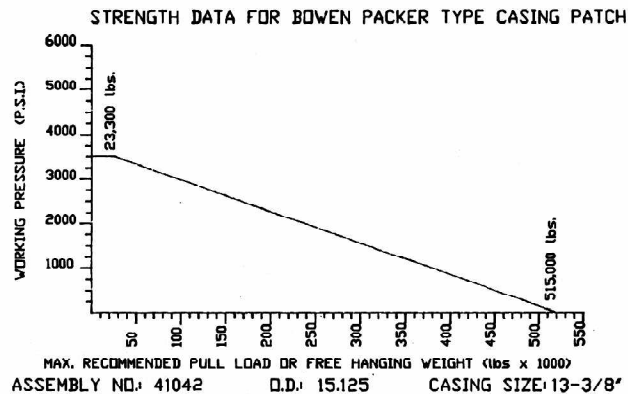
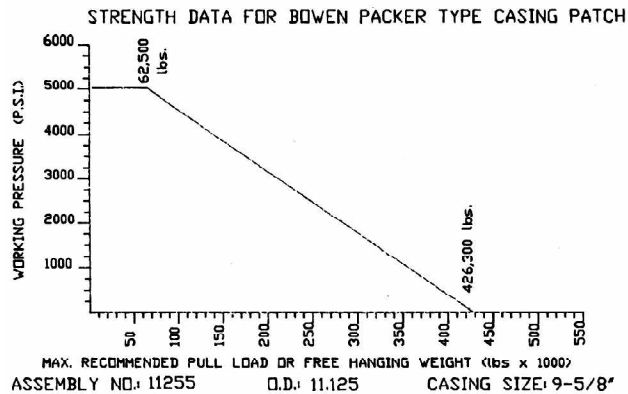


ASSEMBLY NO: 11225 O.D.: 6.8125 CASING SIZE: 5-1/2"

Strength Data



Strength Data



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8411 Irvington Boulevard*
Houston, Texas 77022
United States
Phone: 713 691 7800
Fax: 713 691 7807

2810 Highway 135 North
Kilgore, Texas 75662
United States
Phone: 903 984 2553
Fax: 903 984 7170

10720 West I-20 East
Odessa, Texas 79765
United States
Phone: 432 563 1173
Fax: 432 563 1182

30444 Southwest Freeway
Rosenberg, Texas 77471
United States
Phone: 281 341 5365
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Vernal, Utah 84078
United States
Phone: 435 789 0670
Fax: 435 789 6568

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Clarksburg, West Virginia 26301
United States
Phone: 304 622 4303
Fax: 304 623 2174

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1283 N. Derrick Drive
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Casper, Wyoming 82604
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Phone: 307 237 3100
Fax: 307 237 2546

Canada
9120 – 34A Avenue
Edmonton, Alberta T6E 5P4
Canada
Phone: 780 702 5209
Fax: 780 463 2348

3550 93 Street*
Edmonton, Alberta T6E 5N3
Canada
Phone: 780 944 3929
Fax: 780 430 0760

1100 540 5th Avenue SW (Mailing)
1010 540 5th Avenue SW (Office)
Calgary, Alberta T2P 0M2
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* Denotes Manufacturing and Engineering facilities

Downhole Solutions

Drilling Solutions

Engineering and Project Management Solutions

Lifting and Handling Solutions

Production Solutions

Supply Chain Solutions

Tubular and Corrosion Control Solutions

Well Service and Completion Solutions